

AMENDMENTS TO THE CLAIMS

Claim 1 (Previously Presented): A thermoplastic composition, comprising:

a poly(arylene ether);

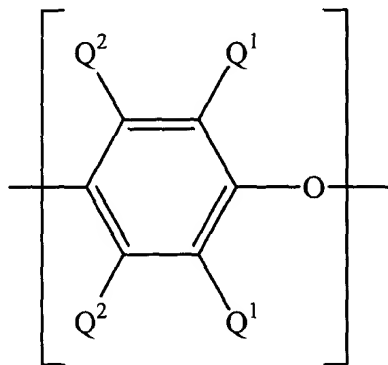
a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene.

Claim 2 (Original): The thermoplastic composition of Claim 1, wherein the poly(arylene ether) comprises a plurality of structural units of the formula



wherein for each structural unit, each Q¹ is independently halogen, primary or secondary C₁-C₈ alkyl, phenyl, C₁-C₈ haloalkyl, C₁-C₈ aminoalkyl, C₁-C₈ hydrocarboxy, or C₂-C₈ halohydrocarboxy wherein at least two carbon atoms separate the halogen and oxygen atoms; and each Q² is independently hydrogen, halogen, primary or secondary C₁-C₈ alkyl, phenyl, C₁-C₈ haloalkyl, C₁-C₈ aminoalkyl, C₁-C₈ hydrocarboxy, or C₂-C₈ halohydrocarboxy wherein at least two carbon atoms separate the halogen and oxygen atoms.

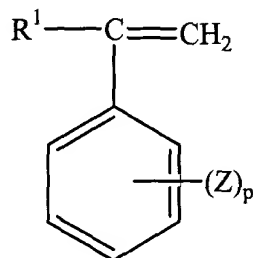
Claim 3 (Original): The thermoplastic composition of Claim 2, wherein each Q¹ is independently C₁-C₄ alkyl or phenyl, and each Q² is independently hydrogen or methyl.

Claim 4 (Original): The thermoplastic composition of Claim 1, wherein the poly(arylene ether) has an intrinsic viscosity of about 0.2 to about 0.6 dL/g as measured in chloroform at 25°C.

Claim 5 (Original): The thermoplastic composition of Claim 1, wherein the poly(arylene ether) comprises a copolymer of 2,6-dimethylphenol and 2,3,6-trimethylphenol.

Claim 6 (Original): The thermoplastic composition of Claim 1, comprising about 10 to about 59 weight percent poly(arylene ether), based on the total weight of the composition.

Claim 7 (Original): The thermoplastic composition of Claim 1, wherein the poly(alkenyl aromatic) resin comprises at least 25% by weight of structural units derived from an alkenyl aromatic monomer of the formula



wherein R^1 is hydrogen, C_1 - C_8 alkyl, or halogen; Z is vinyl, halogen, or C_1 - C_8 alkyl; and p is 0 to 5.

Claim 8 (Original): The thermoplastic composition of Claim 1, wherein the poly(alkenyl aromatic) resin comprises at least one poly(alkenyl aromatic) resin selected from the group consisting of atactic homopolystyrene, syndiotactic homopolystyrene, rubber-modified polystyrene, and mixtures comprising at least one of the foregoing poly(alkenyl aromatic) resins.

Claim 9 (Original): The thermoplastic composition of Claim 1, comprising about 4 to about 46 weight percent poly(alkenyl aromatic) resin, based on the total weight of the composition.

Claim 10 (Original): The thermoplastic composition of Claim 1, wherein the polyolefin comprises a homopolymer or copolymer having at least about 80 weight percent of units derived from polymerization of ethylene, propylene, butylene, or a mixture thereof.

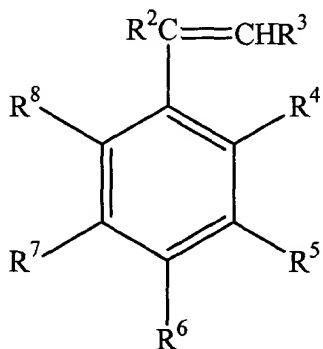
Claim 11 (Original): The thermoplastic composition of Claim 1, wherein the polyolefin is a propylene polymer; and wherein the propylene polymer is a homopolymer of polypropylene, or a random, graft, or block copolymer of propylene and at least one olefin selected from ethylene and C_4 - C_{10} alpha-olefins, with the proviso that the copolymer comprises at least about 80 weight percent of repeating units derived from propylene.

Claim 12 (Original): The thermoplastic composition of Claim 1, wherein the polyolefin comprises a homopolypropylene.

Claim 13 (Original): The thermoplastic composition of Claim 1, comprising about 10 to about 70 weight percent of the polyolefin, based on the total weight of the composition.

Claim 14 (Previously Presented): The thermoplastic composition of Claim 1, wherein the hydrogenated block copolymer comprises:

(A) at least one block derived from an alkenyl aromatic compound having the formula



wherein R^2 and R^3 each represent a hydrogen atom, a $\text{C}_1\text{-C}_8$ alkyl group, or a $\text{C}_2\text{-C}_8$ alkenyl group; R^4 and R^8 each represent a hydrogen atom, a $\text{C}_1\text{-C}_8$ alkyl group, a chlorine atom, or a bromine atom; and $\text{R}^5\text{-R}^7$ each independently represent a hydrogen atom, a $\text{C}_1\text{-C}_8$ alkyl group, or a $\text{C}_2\text{-C}_8$ alkenyl group, or R^4 and R^5 are taken together with the central aromatic ring to form a naphthyl group, or R^5 and R^6 are taken together with the central aromatic ring to form a naphthyl group; and

(B) at least one block derived from a conjugated diene, in which the aliphatic unsaturated group content in the block (B) is reduced by hydrogenation.

Claim 15 (Canceled)

Claim 16 (Original): The thermoplastic composition of Claim 1, wherein the hydrogenated block copolymer has a styrene content of about 50 to about 85 weight percent.

Claim 17 (Original): The thermoplastic composition of Claim 1, wherein the hydrogenated block copolymer has a styrene content of about 55 to about 70 weight percent.

Claim 18 (Original): The thermoplastic composition of Claim 1, comprising about 1 to about 20 weight percent of the hydrogenated block copolymer, based on the total weight of the composition.

Claim 19 (Original): The thermoplastic composition of Claim 1, wherein the unhydrogenated block copolymer comprises a styrene-butadiene diblock copolymer, a styrene-butadiene-styrene triblock copolymer, or a styrene-butadiene radial teleblock copolymer.

Claim 20 (Original): The thermoplastic composition of Claim 1, comprising about 1 to about 20 weight percent of the unhydrogenated block copolymer.

Claim 21 (Original): The thermoplastic composition of Claim 1, further comprising a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 10 to less than 40 weight percent.

Claim 22 (Currently Amended): ~~The A~~ thermoplastic composition, ~~of Claim 1, further~~ comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene; and

a polypropylene-polystyrene graft copolymer.

Claim 23 (Currently Amended): ~~The A~~ thermoplastic composition ~~of Claim 22,~~
comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of
the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a
conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic
content of 40 to about 90 weight percent, and wherein the hydrogenated block copolymer
comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

an unhydrogenated block copolymer of an alkenyl aromatic compound and a
conjugated diene; and

a polypropylene-polystyrene graft copolymer; wherein the polypropylene-
polystyrene graft copolymer comprises a graft copolymer having a propylene polymer
backbone and one or more styrene polymer grafts.

Claim 24 (Currently Amended): ~~The A~~ thermoplastic composition ~~of Claim 23,~~
comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of
the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a
conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic
content of 40 to about 90 weight percent, and wherein the hydrogenated block copolymer
comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

an unhydrogenated block copolymer of an alkenyl aromatic compound and a
conjugated diene; and

a polypropylene-polystyrene graft copolymer; wherein the polypropylene-
polystyrene graft copolymer comprises a graft copolymer having a propylene polymer
backbone and one or more styrene polymer grafts; and wherein the polypropylene-
polystyrene graft copolymer comprises about 10 to about 90 weight percent of the
propylene polymer backbone and about 90 to about 10 weight percent of the styrene
polymer grafts.

Claim 25 (Currently Amended): ~~The A~~ thermoplastic composition of Claim 22, comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene; and

about 0.5 to about 15 weight percent of ~~the~~ a polypropylene-polystyrene graft copolymer, based on the total weight of the composition.

Claim 26 (Previously Presented): The thermoplastic composition of Claim 1, wherein the polyolefin is homopolypropylene, and wherein the composition further comprises an ethylene/alpha-olefin elastomeric copolymer.

Claim 27 (Original): The thermoplastic composition of Claim 26, wherein the ethylene/alpha-olefin elastomeric copolymer comprises a copolymer of ethylene and at least one C₃-C₁₀ alpha-olefin.

Claim 28 (Original): The thermoplastic composition of Claim 26, wherein the ethylene/alpha-olefin elastomeric copolymer comprises an ethylene-butylene rubber, an ethylene-propylene rubber, or a mixture thereof.

Claim 29 (Original): The thermoplastic composition of Claim 26, comprising about 1 to about 20 weight percent of the ethylene/alpha-olefin elastomeric copolymer.

Claim 30 (Original): The thermoplastic composition of Claim 1, further comprising at least one additive selected from the group consisting of stabilizers, mold release agents, processing aids, flame retardants, drip retardants, nucleating agents, UV blockers, dyes, pigments, particulate fillers, reinforcing fillers, conductive fillers, anti-static agents, blowing agents, and antioxidants.

Claim 31 (Original): The thermoplastic composition of Claim 1, wherein the composition is substantially free of reinforcing fillers.

Claim 32 (Original): The thermoplastic composition of Claim 1, wherein the composition after molding has less than about 10% batch-to-batch variability in Izod Notched Impact Strength at 23°C measured according to ASTM D256.

Claim 33 (Original): The thermoplastic composition of Claim 1, wherein the composition after molding has less than about 5% batch-to-batch variability in Flexural Modulus at 23°C measured according to ASTM D790.

Claim 34 (Original): The composition of Claim 1, wherein the composition after molding has a flexural modulus at 23°C greater than about 100 kpsi and an Izod notched impact strength greater than about 1 ft-lb/in.

Claim 35 (Previously Presented): A thermoplastic composition, comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene;

wherein the poly(arylene ether) and the poly(alkenyl aromatic) resin form a single phase having a glass transition temperature at least about 20°C greater than the glass transition temperature of the poly(alkenyl aromatic) resin alone.

Claim 36 (Previously Presented): A thermoplastic composition, comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene;

wherein the poly(arylene ether) and the poly(alkenyl aromatic) resin form a single phase having a glass transition temperature up to about 15°C greater than the melting temperature of the polyolefin alone.

Claim 37 (Previously Presented): A thermoplastic composition, comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene;

wherein the poly(arylene ether) and the poly(alkenyl aromatic) resin form a single phase having a glass transition temperature of about 130°C to about 180°C.

Claim 38 (Previously Presented): A thermoplastic composition, comprising:

a poly(arylene ether);

a poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene; and

a polypropylene-polystyrene graft copolymer.

Claim 39 (Previously Presented): A thermoplastic composition, comprising:

about 10 to about 59 weight percent of a poly(arylene ether);

about 3 to about 46 weight percent of a poly(alkenyl aromatic) resin, with the proviso that the weight ratio of the poly(alkenyl aromatic) resin to the poly(arylene ether) is at least about 3:7;

about 10 to about 70 weight percent of a polyolefin;

about 1 to about 20 weight percent of a hydrogenated block copolymer of alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

about 1 to about 20 weight percent of an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene;

wherein all weight percents are based on the total weight of the composition.

Claim 40 (Previously Presented): A thermoplastic composition, comprising:

about 10 to about 59 weight percent of a poly(arylene ether);

about 1 to about 46 weight percent of a poly(alkenyl aromatic) resin;

about 10 to about 70 weight percent of a polyolefin;

about 1 to about 20 weight percent of a hydrogenated block copolymer of alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer;

about 1 to about 20 weight percent of an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene; and

about 0.5 to about 15 weight percent of a polypropylene-polystyrene graft copolymer;

wherein all weight percents are based on the total weight of the composition.

Claim 41 (Previously Presented): A thermoplastic composition, comprising:

about 10 to about 59 weight percent of a poly(arylene ether);

about 1 to about 46 weight percent of a poly(alkenyl aromatic) resin;

about 1 to about 20 weight percent of an unhydrogenated block copolymer of alkenyl aromatic compound and a conjugated diene;

about 10 to about 70 weight percent of a polyolefin;

about 1 to about 20 weight percent of an ethylene/alpha-olefin elastomeric copolymer;

about 1 to about 20 weight percent of a hydrogenated block copolymer of alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

about 0.5 to about 15 weight percent of a polypropylene-polystyrene graft copolymer;

wherein all weight percents are based on the total weight of the composition.

Claim 42 (Previously Presented): A thermoplastic composition, comprising the reaction product of:

a poly(arylene ether);

a poly(alkenyl aromatic) resin in an amount of at least about 30 weight percent of the total of the poly(arylene ether) and the poly(alkenyl aromatic) resin;

a polyolefin;

a hydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene, wherein the hydrogenated block copolymer has an alkenyl aromatic content of about 40 to about 90 weight percent, and wherein the hydrogenated block copolymer comprises a styrene-(ethylene-butylene)-styrene triblock copolymer; and

an unhydrogenated block copolymer of an alkenyl aromatic compound and a conjugated diene.

Claim 43 (Original): An article comprising the composition of Claim 42.

Claim 44 (Original): An article comprising the composition of Claim 42, wherein the article is formed using at least one method selected from the group consisting of injection molding, blow molding, extrusion, sheet extrusion, film extrusion, profile extrusion, pultrusion, compression molding, thermoforming, pressure forming, hydroforming, vacuum forming, and foam molding.

Claim 45 (Original): An article comprising the composition of Claim 42, wherein the article is formed using blow molding or foam molding.

Claim 46 (Original): A sheet comprising the composition of Claim 42.

REMARKS

Support for Claim Amendments

Claims 22-25 have been rewritten in independent form. Support for these amendments may be found in Claims 1, 22, and 23 as filed.

Claim Objections

Claims 22-25 were objected to as being dependent upon a rejected base claim but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim. (6/25/03 Office Action, page 4, first paragraph.) Claims 22-25 have been rewritten in independent form including all of the limitations of the base claim and any intervening claim. Accordingly, Applicants request the withdrawal of the objection and the allowance of Claims 22-25.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-14, 16-21, and 26-46 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over JP 06-57008 to Yoshio et al. (hereinafter “Yoshio”; note that the Office Action refers to this reference as “Hideki”, which is the name of the second-named inventor). Applicants respectfully traverse this rejection.

Yoshio generally describes a method of producing a resin composition, where the composition comprises (A) 40-94 parts by weight of a polyphenylene ether resin, (B) 2-20 parts by weight of a polyolefin resin having a number average molecular weight of at least 30,000 (preferably ethylene-propylene copolymer or low density polyethylene), and (C) 4-40 parts by weight of a vinylic aromatic compound-conjugated dienic compound copolymer (preferably styrene-butadiene copolymer) and/or the hydrogenation product of the copolymer. Components (A) and (B) are melt-kneaded with each other and subsequently further melt-kneaded with component (C) to produce the composition. (Patent Abstract of Japan record for Yoshio.) Yoshio describes the preparation of a polystyrene-polybutadiene-polystyrene block copolymer having a polystyrene content of 50 weight percent. (Machine translation of Yoshio, paragraph [0025].) This block copolymer is subsequently hydrogenated. (*Id.*, paragraph [0026].) All of Yoshio’s

examples and comparative examples appear to use either a combination of two unhydrogenated block styrene-butadiene copolymers or a single hydrogenated block styrene-butadiene copolymer. (Id., paragraphs [0027] to [0040].)

The Examiner has stated that

[i]t would have been obvious to a practitioner having ordinary skill in the art at the time of the invention to use the hydrogenated styrene butadiene styrene block copolymer of patentee in the Examples of patentee since patentee specifically discloses that the hydrogenated styrene butadiene styrene block copolymer containing 50% styrene may be used in their composition and in the expectation of adequate results absent any showing of surprising or unexpected results.

(6/25/2003 Office Action, page 3, first paragraph)

Applicants are submitting herewith a declaration with one example and two comparative examples having the same total block copolymer content. These data collectively show that Applicants' inventive compositions having both hydrogenated and unhydrogenated block copolymers unexpectedly exhibit markedly superior impact strength compared to compositions containing either hydrogenated block copolymer or unhydrogenated block copolymer alone. Specifically, a composition containing 4.01 weight percent each of a hydrogenated styrene-butadiene-styrene triblock copolymer and an unhydrogenated styrene-butadiene-styrene triblock copolymer exhibited a Dynatup (falling dart) energy to failure value of 11.8 foot-pounds, which is 111% greater than the value of 5.6 foot-pounds exhibited by a composition with 8.02 weight percent of the hydrogenated block copolymer alone, and 637% greater than the value of 1.6 foot-pounds exhibited by a composition with 8.02 weight percent of the unhydrogenated block copolymer alone. These unexpected and synergistic results are sufficient to overcome any alleged prima facie case based on Yoshio. Applicants' Claims 1-14, 16-21, and 26-46 are therefore patentable over Yoshio, and reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. §103(a) is respectfully requested.

Claims 1-14, 16-21, and 26-46 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,509,412 to Hall (hereinafter "Hall"). Applicants respectfully traverse this rejection.


Hall was issued January 21, 2003 on an application filed September 29, 2000. The present application was filed November 1, 2001, claiming priority to a provisional application filed December 28, 2000. Hall is therefore available as prior art only under 35 U.S.C. §102(e). Applicants are submitting herewith a declaration and accompanying documentary evidence showing that they were in possession of their invention before the September 29, 2000 filing date of Hall. Accordingly, Hall is not available as prior art under 35 U.S.C. §102(e), and it cannot serve as the basis for a 35 U.S.C. §103(a) rejection. Applicants therefore request the reconsideration and withdrawal of the rejection of Claims 1-14, 16-21, and 26-46 under 35 U.S.C. § 103(a).

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 07-0862 maintained by Assignee.

Respectfully submitted,

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